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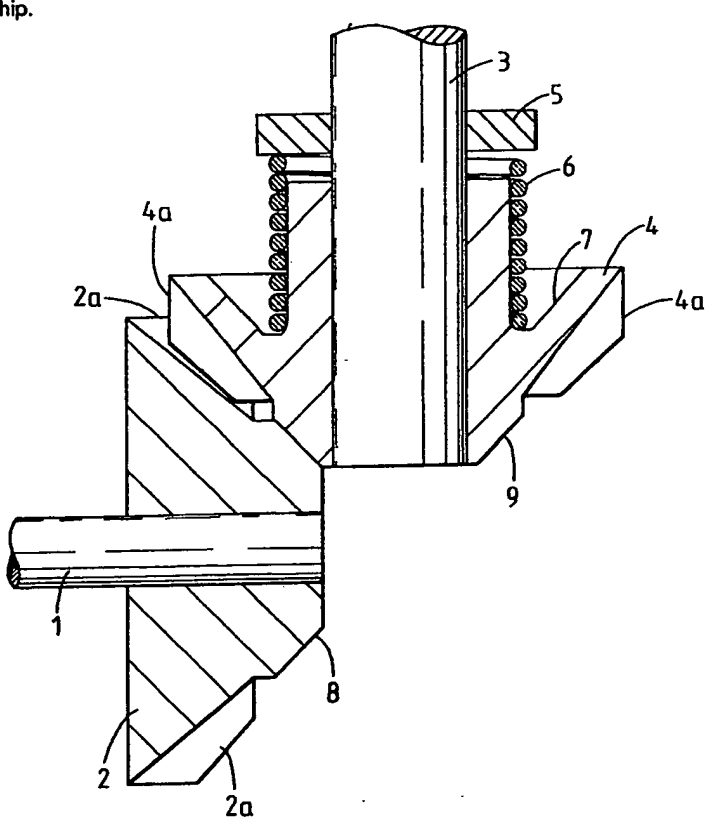
Selected US specifications from IPC sub-class F16H

(54) Bevelled gear transmission

(57) Apparatus for transmitting drive through an angle, for example a right angle, comprises a pair of intermeshing bevelled gears (2, 4). The apparatus automatically self adjusts to compensate for any assembly or other tolerances since one of the gears is axially spring biased towards the other gear. To limit the extent to which the gears may mesh and so maintain a predetermined operating clearance between the teeth (2a, 4a), of the gears (2, 4) a frusto-conical portion (8, 9) is included on the tapered side of each gear (2, 4) the surfaces of these frusto-conical portions being arranged to bear against each other in rolling relationship.



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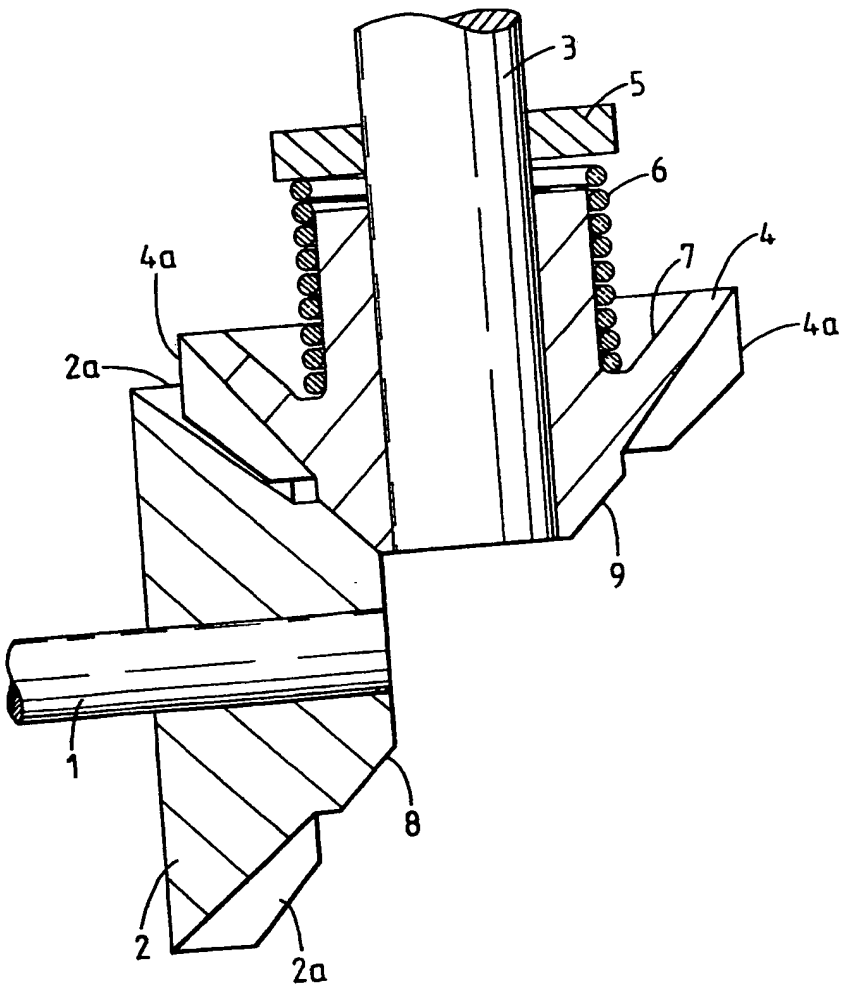
3
5
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Bevelled Gear Transmission

This invention relates to apparatus for transmitting drive through an angle.

It is known to use intermeshing bevelled gears to transmit drive between inclined shafts. For effective operation, however, it is vital that the bevelled gears are in accurate engagement. In order to cater for variations in tolerances during assembly of the transmission apparatus it is often necessary to adjust the position of the gears to ensure that the gears mesh correctly after assembly has been completed.

Bevelled gear mechanisms with spring biasing are disclosed in US Patent Nos 3 943 780; 4 244 243; 4 391 157; 4 437 355; and 4 607 538.

According to the present invention there is provided apparatus for transmitting drive through an angle, comprising a pair of meshing bevelled gears, wherein a respective frusto-conical member is provided on each of the gears at their tapered sides, the surfaces of said frusto-conical members being arranged to bear against each other in rolling relationship.

In this apparatus the pitch cone line of the gears is determined by the coacting surfaces of the frusto-conical members. Suitably, the frusto-conical members are formed integrally with the gears. Preferably, one of the gears is axially spring biased towards the other gear.

A transmission apparatus in accordance with the invention not only transmits drive through an angle, but has the advantage that it is self-adjusting in that the spring biasing automatically compensates for variations in tolerances and holds the gears in meshing engagement without the need for manual post-assembly adjustment. This transmission is therefore ideally suited to a production situation where for economical, strategic or technical reasons it is preferable not to have to carry out any fine adjustment of the drive components after assembly.

In a preferred embodiment one of the gears is slidably mounted on a first shaft, and the other gear is fastened to a second shaft. The first shaft may be provided with a fixed flange, and the spring biasing comprises spring means extending between the flange and said one gear.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings in which:

The single Figure is a cross section of a drive transmission apparatus in accordance with the invention.

The drive transmission apparatus shown in Figure 1 comprises a first rotatable shaft 1 having fixed at one end thereof a bevelled gear 2 with teeth 2a. A second rotatable shaft 3 which is substantially orthogonal to shaft 1 has a bevelled gear 4 with teeth 4a slidably

mounted thereon. The shaft 3 and the bore of gear 4 are provided with complementary flats to enable drive to be transmitted therebetween. A circlip 5 is fastened onto the shaft 3 and a coil compression spring 6 is present coaxially on shaft 3 so that it abuts circlip 5 and extends into a recess 7 in the gear 4. The spring 6 thus acts to urge the gear 4 into meshing engagement with gear 2.

The gear 2 has an integral frusto-conical portion 8 on its tapered side and gear 4 similarly has an integral frusto-conical portion 9 on its tapered side, such that when the gears 2 and 4 are in mesh the two faces of the frusto-conical portions 8 and 9 roll together limiting the extent to which the gears can mesh and so maintaining a predetermined operating distance between the teeth 2a, 4a of the respective gears 2, 4. In this way the teeth of one gear are prevented from bottoming on the mating gear. The coacting surfaces of the frusto-conical portions 8, 9 are coincident with the pitch cone line of the gears.

In this embodiment either shaft 1 or shaft 3 may be directly driven by a motor (not shown) while the other shaft is driven indirectly via the meshing gears 2 and 4.

In view of the foregoing description it will be evident to a person skilled in the art that various modifications may be made within the scope of the present invention. For example, the frusto-conical portions on the gears 2 and 4 need not be integral therewith but may be separate members fastened thereto. On the other hand, instead of the circlip 5, the shaft 7 may be provided with an integral flange for the same purpose of retaining the spring 6.

Claims:

1. Apparatus for transmitting rotary drive through an angle, comprising a pair of meshing bevelled gears, wherein a frusto-conical member is provided on each of the gears at their tapered sides, the surfaces of said frusto-conical members being arranged to bear against each other in rolling relationship.

2. Apparatus as claimed in claim 1, wherein the frusto-conical members are integral with their respective associated gears.

3. Apparatus as claimed in claim 1 or claim 2, wherein one of the gears is axially spring biased towards the other gear.

4. Appararatus as claimed in claim 3, wherein said one gear is slidably mounted on a first shaft, and the other gear is fastened to a second shaft.

5. Apparatus as claimed in claim 4, wherein the first shaft is provided with a fixed flange, and the spring biasing is provided by spring means extending between the flange and the one gear.

6. Apparatus as claimed in claim 5, wherein the spring means comprises a coil spring mounted coaxially with said one shaft.

7. Apparatus for transmitting drive through an angle, substantially as herein described with reference to the accompanying drawing.

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